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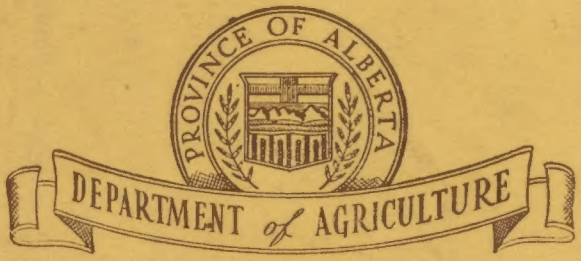
BULLETIN No. 35.

REPRINT
JULY, 1945.

BEEKEEPING FOR BEGINNERS IN ALBERTA

BY

W. G. LE MAISTRE
Provincial Apiarist



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HON. D. B. MacMILLAN
MINISTER OF AGRICULTURE

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EDMONTON, ALBERTA

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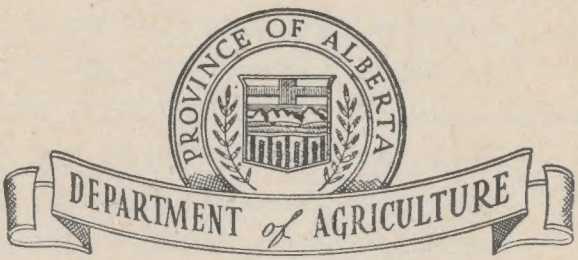

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FOREWORD

Bees are of first importance as pollinators of fruit and seed crops. They are generally kept in Alberta at present, however, for the honey they produce.

Most Alberta farms could support two or three colonies of bees, which would yield sufficient honey for the household. Some districts are capable of producing considerable surplus honey for market.

This elementary bulletin, "Beekeeping For Beginners In Alberta", is written in simple terms and provides practical instructions for the guidance of those unfamiliar with proper beekeeping practices.

O. S. LONGMAN,
Deputy Minister.

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Beekeeping For Beginners In Alberta

(W. G. LE MAISTRE, PROVINCIAL APIARIST)

The purpose of this bulletin is to provide the beginner in beekeeping with an up-to-date knowledge of bees and beekeeping methods. The common knowledge about most agricultural pursuits does not usually include accurate and useful information about modern beekeeping methods.

It is not possible to tame and control bees like other domestic animals. Advantage is taken by the beekeeper of the natural and acquisitive habits of bees to obtain the honey that he wants. Before he can do this successfully, however, he must have a knowledge of the habits of bees. One section of this bulletin, therefore, is devoted to outlining the natural behaviour of bees. It supplies the beginner with a starting point from which to gain more knowledge and experience.

Knowledge about bees is being expanded, and systems of management change with changing conditions, therefore it should not be assumed that instructions contained herein should be slavishly followed. It is assumed that as experience is gained, different techniques and systems of management will be employed.

HONEY FLOWS

Nectar secretion is limited by weather and flora. There are relatively few districts in Alberta where beekeeping becomes impossible. That is to say, at least two or three hives can be kept and these would produce enough honey to provide honey for a household almost anywhere outside the arid sections of the south-east. Commercial honey production, however, is only advisable in those areas where relatively large acreages of the clovers and alfalfa are growing and where the climate is suitable to nectar secretion or where irrigation is practiced.

An intimate knowledge of the clover acreage in any given district should be a sufficient guide to its suitability for honey production, when due consideration is given to the question of rainfall.

Honey flows, in general, are somewhat erratic. They are greatly affected by local weather conditions. An outline of them is given because the management of the colonies should be governed by them. The dates of their occurrence vary greatly with the district and the season.

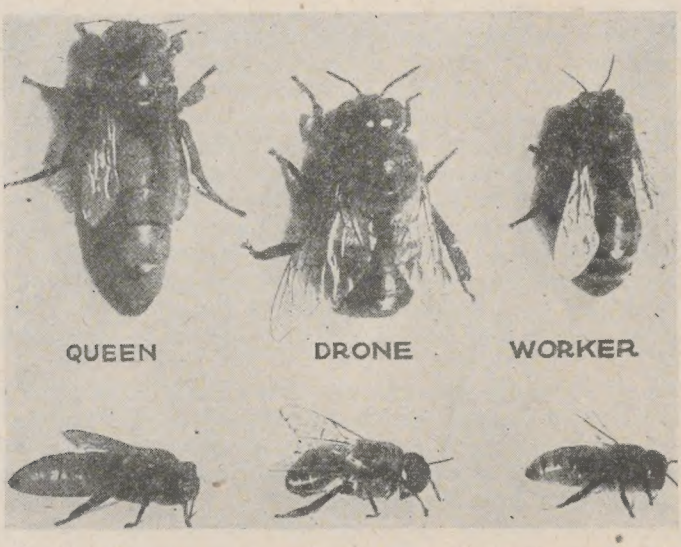
There are usually three distinct honey flows with periods of dearth between them. They are called "spring flow", "main flow", and "fall flow." The spring flow does not often provide surplus honey, but it is of great importance to the colony in providing food for building up its bee population in readiness for the main honey flow. The sources of nectar and pollen in this flow are mostly willows, pin cherries, choke cherries, other

wild fruit and dandelions. It usually occurs between the middle of April and the end of May. The main honey flow provides the bulk of the surplus honey removed by the beekeeper. The sources of nectar in this flow are mostly sweet clover, fireweed, alfalfa, white and alsike clover, and wild raspberries. This flow may begin about the middle of June and end about the first week in August. The fall flow sometimes provides additional surplus honey for extracting, but it is usually more important in stimulating late brood rearing for those colonies to be wintered. The sources of nectar in this flow are mostly second growth clover and alfalfa. It begins about the middle of August and may continue in varying intensity until the first killing frost, which often occurs during the first two weeks of September.

THE COLONY

Every colony has a distinctive odour, perceptible to bees, though not to human senses. It assists each hive in maintaining itself as an individual entity. This colony odour enables the bees of any hive to detect the presence of a strange bee that might be endeavouring to steal honey. It is the colony odour that sometimes makes it difficult to introduce a new queen into a hive that has become queenless.

Bees are called social insects. This means, in general, that one bee cannot live alone. The work of many individuals is necessary to the support of all. In order to maintain the services necessary to the existence of the colony, the work is divided between the individuals in a most interesting manner.



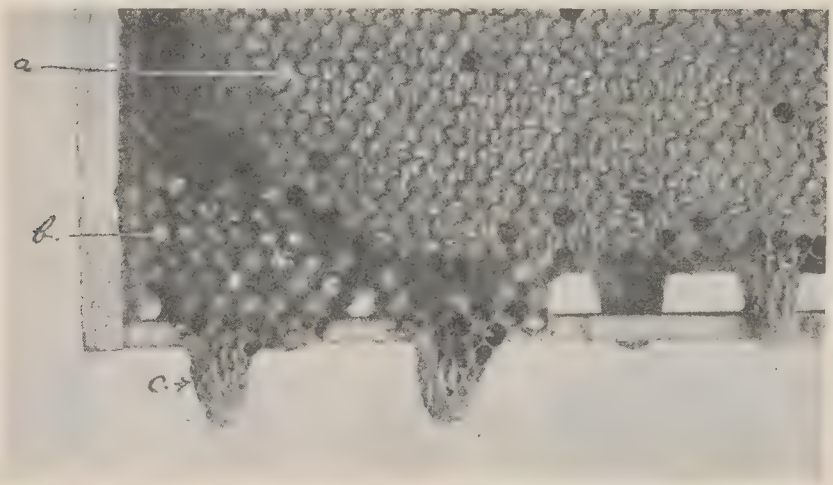
—Courtesy A. I. Root Co.

Queen, Drone and Worker.

A normal colony of bees consists of one queen, a few hundred drones and from ten thousand to perhaps sixty thousand worker bees. The queen is considered the most important mem-

ber of the colony. It is she who is responsible for laying all the eggs that are to develop into the other members of the colony. As bees become old and die, their places must be taken by young and vigorous bees. Unless a colony has a prolific queen, it will either die, or at best, be unproductive through a lack of enough bees to carry on all the activities necessary to productivity.

The queen bee can be recognized by her size. She is one-quarter to one-third longer than the worker bees. Her abdomen is not banded like that of the worker. She is raised in a specially elongated cell in the brood nest.



—Courtesy Dominion Department of Agriculture.

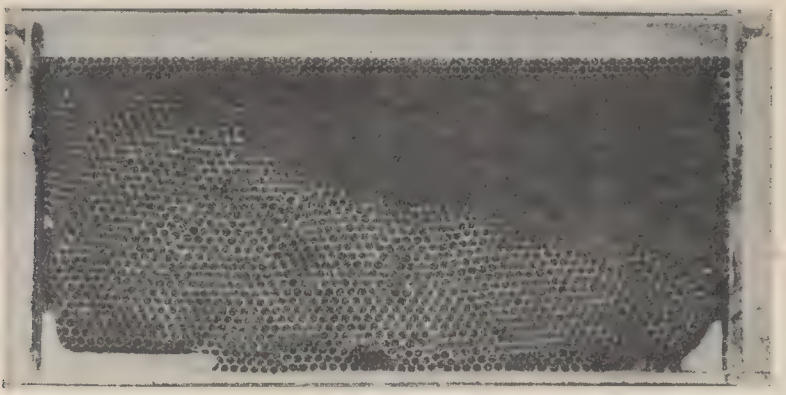
Corner of brood comb showing (a) capped worker brood; (b) capped drone brood; (c) capped queen cells.

The virgin queen goes on her mating flight from three to seven days after emerging from the queen cell. She is only mated once in her lifetime. Though a queen may live four or five years, it is considered good beekeeping practice to replace her after one or two seasons. Some queens become incapable of laying sufficient eggs to build up a strong colony after one season, or at the most two seasons, of heavy egg-production.

The drone bee has only one function that we recognize, and that is mating with the queen. Since only one drone is necessary for this purpose, beekeepers try to reduce the number of drones in their hives. They consume stores that might otherwise be available as surplus and also require the attention of workers to feed them. Drones are produced in cells somewhat similar to the worker cells, though slightly larger. The cappings on drone brood are dome-shaped and are raised more than worker-brood cappings.

It has recently been suggested, as a result of careful observation, that a hive with some drones in it seems to work better

than one that has none. Furthermore, drone brood should not be destroyed or cut out—this is inclined to make the bees cross. In order to reduce the drone population of a hive, the good beekeeper uses combs in his brood nest that have but very few drone cells in them.



—Courtesy American Bee Journal.

Comb showing drone and worker cells, a poor brood comb.

Worker bees perform all the work of the hive. Following is a brief outline of the duties of the worker bees:—

For the first three days after emerging from the cell the young bee is engaged in cleaning cells ready for the deposition of eggs by the queen or honey by the bees. When from three to six days old, the young bees feed the oldest larvae a mixture of pollen and honey obtained from the stores of the hive. From six to thirteen days old, they secrete "royal jelly"—the food fed to young larvae and to the queen. At this age they take short "play flights" about the hive. For the next eight days their duties are more varied; they include guarding the hive, secreting wax and building comb, cleaning the hive, taking honey from the field bees and ripening it, storing pollen and ventilating the hive. When about three weeks old, the workers become field bees and will gather nectar, pollen or water as the occasion demands. In the height of the season, a bee's wings wear rapidly and within three weeks of becoming a field bee, it usually dies. Thus the worker lives only about six weeks in mid-season: three weeks as a worker in the hive and three weeks as a field bee. However, in the spring and fall when activity is not so great, the wings do not wear so quickly and the worker lives longer. In fact, when there is little activity, as in winter, a worker hatching in September may live seven months.

LIFE CYCLE OF BEES

	Egg	Larva	Pupa	Total	Adult
Queen	3 days	5½ days	7½ days	16 days	2- 6 years
Worker	3 days	6 days	12 days	21 days	6-30 weeks
Drone	3 days	6½ days	14½ days	24 days	4-12 weeks

In every normal hive there is an area called the brood nest. This brood nest is more or less spherical in shape, varying greatly in size depending on the season and ability of the bees to rear brood. In spring and fall it may be only six inches in diameter, covering three or four combs, but in mid-season it should be four or five times that size. Above and at the sides of the brood nest are the stores of pollen and honey that the colony will use as food. It is some of this honey, stored by the bees as surplus food supplies against a period of scarcity, that the beekeeper takes. The amount the beekeeper can remove varies with the ability of the colony to store a surplus over and above its requirements.

HINTS FOR BEGINNERS

Learn About Bees.

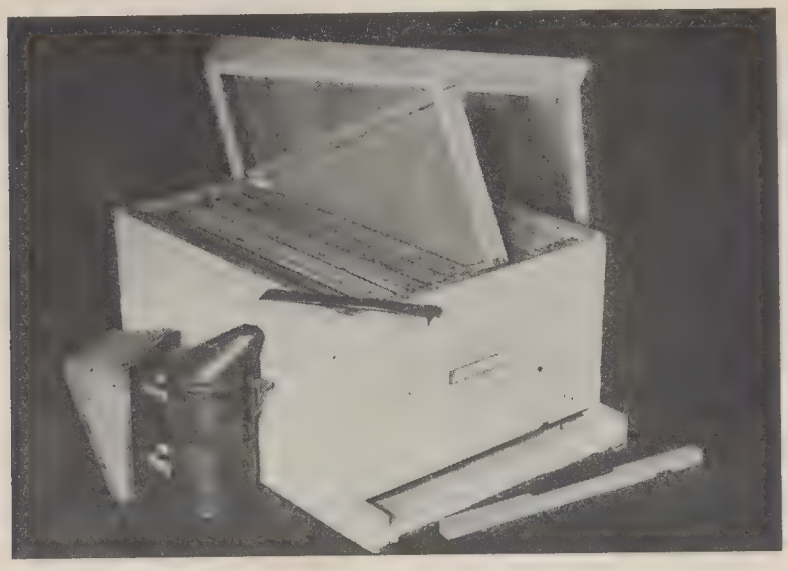
Before buying bees and equipment, a book on beekeeping should be studied. Some publications on beekeeping are listed on page 40. It is a good practice to familiarize oneself with bees through assisting a neighbour with his. Not before being satisfied that one has the patience and the inclination to attend to bees properly should one venture into beekeeping. Unless prepared to take a few stings and give the proper attention to the hives, money spent on equipment is going to be wasted.

A beginner is recommended to start with two hives rather than one. Should it so happen, as indeed it sometimes does, that the queen from a single hive disappears, then there is no way of replacing her in time for that hive to be productive. Where two hives are maintained, some brood from the queen-right one may be given to the queenless one and it will raise a new queen for itself. Should anyone desire to go into beekeeping on a large scale, then the best method to learn beekeeping is to obtain employment for a season or two with a good, practical, commercial beekeeper.

Equipment.

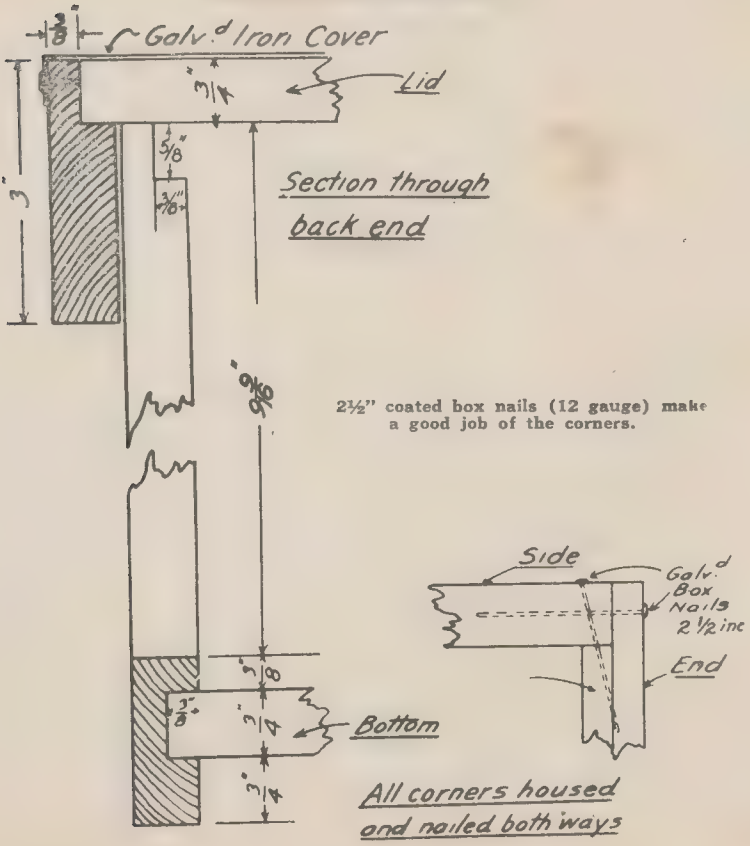
It is necessary for a beekeeper to examine his hives from time to time. Until Langstroth discovered that bees sealed all spaces less than three sixteenths of an inch in width, or built comb in all spaces greater than five-sixteenths of an inch in width, it was very difficult to pry the combs loose for examination. But now all hives are constructed with this fact in mind, and providing care is taken to construct hives on this principle, opening and examining is a simple matter. A standard hive which embodies this principle has been adopted so that when buying or making equipment it is very important to see that only standard size is obtained.

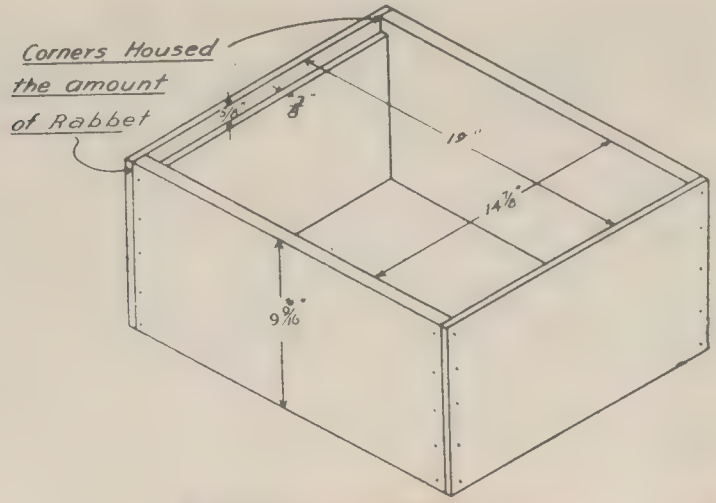
A hive consists of a bottom board, a brood chamber containing ten combs, and from two to five supers containing combs for honey storage, and a cover. The supers and brood chamber are made identically the same; combs are, therefore, interchangeable.



Equipment for a start with bees.

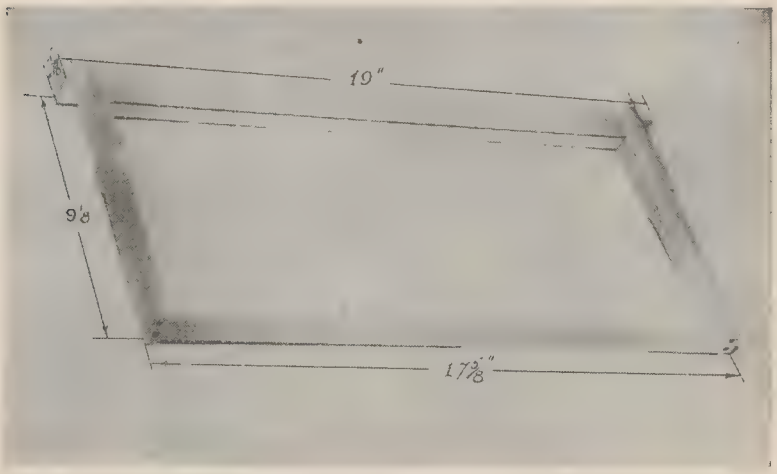
Detail of Construction



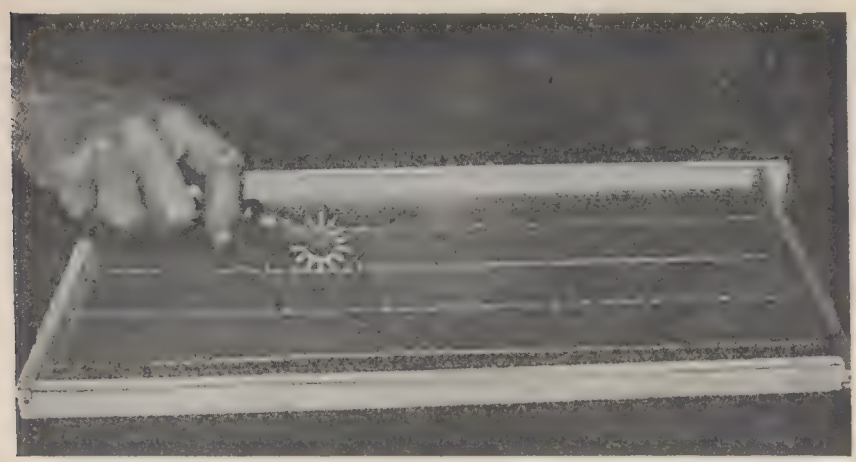


Dimensions and construction of super.

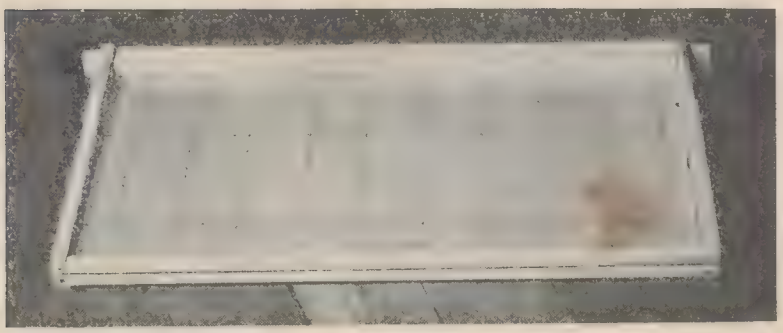
Frames are nailed with No. 18 gauge nails 1" or 1¼" long. All frames are fitted with "foundation" (a sheet of bees-wax having the imprint of worker cells on it). It is obtainable from the bee-supply manufacturers. Cross wiring with No. 28 tinned wire is necessary for the support of the foundation which is suspended from a saw cut in the top bar. The wire is embedded in the foundation with a spur embedder or by heating it slightly with an electric current — a six-volt car battery or reduced 110-volt current.



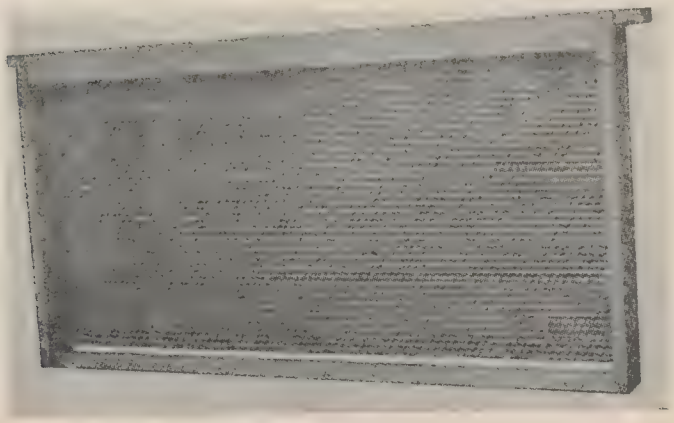
Standard Frame Dimensions.



—Courtesy Dominion Department of Agriculture.
Embedding wires in foundation.



Wired Foundation.



Plain Foundation.

There are several kinds of foundation. Two types are illustrated on page 12. It must be borne in mind when putting foundation in a frame, that when the bees begin drawing it out, it will stretch. In order to prevent bulging or buckling, then, it is necessary to have the foundation hanging freely between the two pieces of a split bottom bar or have it short of the bottom bar by at least a quarter of an inch. Wired foundation is best used with a split bottom bar, though plain foundation is quite satisfactory with a solid bottom bar frame, providing there is at least a quarter of an inch gap between it and the foundation.

Bee Veil

There are several types of queen excluders. They are not essential, but rather desirable pieces of equipment.

Besides the hive, a beekeeper needs a smoker, a bee veil and a hive tool (a screwdriver will serve).

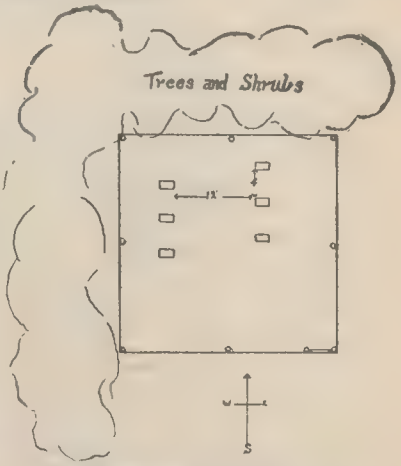
When the combs have been filled with honey, the wax cappings are shaved off. This is done with an uncapping knife, but a good butcher knife, well-heated in hot water, answers the purpose. Some people use two knives, one standing in hot water whilst the other is in use, interchanging them when the one in use cools.

An extractor removes the honey from the combs without destroying them. Carefully handled combs are good for many years.

Location of the Apiary.

Bees are capable of flying six or seven miles from their hives in search of food, yet the ordinary range is usually limited to about two miles. This means that any source of nectar within two miles of a hive is available to the bees. Thus, since it is unnecessary to have the hives sitting right in a field of clover, a good location can often be selected.

The diagram shows an ideal lay-out for an apiary. It is fenced against cattle and horses and protected against



An ideally situated apiary; low-growing bushes and evergreens give winter and spring protection.

the cold prevailing winds by trees and shrubs, and exposed to the morning sun. The hives are so placed that ample space to work around them is provided and excessive drifting of bees, which sometimes occurs when hives are close together in long rows, is eliminated. Wind protection is very important and artificial wind-breaks of slatted fencing should be used if natural wind-breaks are not available.

Bees use quite an amount of water in the spring, and unless the hives are located fairly close to a supply of clean water, some should be provided. Low, damp places where the air may become stagnant, should be avoided.

Hives should be at least 100 yards away from roads, buildings, and grain fields where horses may be working.

Each hive should be on a stand of its own, up off the ground, but with an alighting board at the front.

PACKAGES.

Bees are sold by the pound by bee breeders in the southern United States. Usually a 2-pound package with a queen will establish itself in a hive in Alberta in time to be strong enough to gather a honey crop. Some beekeepers prefer 3-pound packages; they believe they get stronger colonies and consequently more honey.

Packages should be installed between the middle of April and the 5th of May. Orders should be placed early in the year to make sure of delivery in good time.

When the package arrives place it in a cool (60° F.), dark place. Prepare a sugar syrup with one part of sugar to two parts of water. Paint this syrup lavishly on the screen two or three times.

Prepare a hive with five combs, or frames of foundation if combs are not available. Obtain a honey pail or jam tin and perforate its lid with twenty or thirty holes about the size of a shingle nail, then fill the tin with sugar syrup. Place an entrance block in the hive entrance, reducing it to about half an inch in width. Have a cloth or sack with a three-inch hole in it, two strips of lath about twelve inches long, an empty super and a hive cover handy.

The package should be installed either when the weather is dull and cool or just before dusk. When it is warm and sunny, the bees will fly a great deal and may drift away from the hive. It should not be necessary to use a smoker, but have it going and handy just in case the bees get too excited.

Carry the package from its cool, dark place without jarring or exciting the bees, setting it down beside the hive. Pry the thin piece of board off the top—it is quite safe, the bees cannot escape yet. There will be a wire or piece of metal attached to the queen cage, which hangs in the cluster of bees; hold this wire with one hand and remove the feeder can from the package with the other, gently placing it on its side on the frames in the hive. Now pull out the queen cage and replace the thin board so the bees from the package cannot escape. Examine the queen cage; if necessary, gently shake the bees off it into the hive.

If the queen is alive and active, remove the covering from the candy end of the cage and poke a match through the candy, being careful not to injure the queen nor making the hole large enough for her to escape. Now hang the queen cage, candy-end upwards, between two frames. Shake the bees off the feeder can and throw it to one side. Take hold of the package and give it a sharp shake or jar on the ground. This action will dislodge the hanging bees so that the thin board covering the hole where the feeder can had been, may be removed. Now pour out, immediately, at least half the bees right over the queen cage on the frames, place the package in the space beside the frames, put the two pieces of lath so they will form a bridge from the package to the cluster on the frames, then place the sack over the hive, the hole in it above the frames. Invert the prepared feed can over the hole and lastly, set on the empty super and the cover.

—Courtesy Dominion Department of Agriculture.

Removing feed can from package.

Removing queen cage from package.

The following day, with as little disturbance as possible, remove the package. If the bees are not all out of it, jar it on the ground and shake them out into the hive; put in the other five frames. If the queen has been released, remove the queen cage. Do not disturb this newly installed hive for seven or ten days, other than to check on the syrup can; this must be refilled at least four times unless the bees are getting fresh nectar outside the hive, in which case, they will not use it.

The most important features of building strong colonies from packages are feed and warmth—assuming the queen is a good one. When possible, some pollen and honey combs are saved from the previous season to give to packages; when this is not possible, a liberal supply of syrup must be provided. Warmth cannot be provided, but it is possible so to protect a

hive that the heat it will generate is conserved. Good windbreaks, entrance block, sack over the brood nest, and wrapping the hive with tar paper all help.

A great deal depends on the start a package gets. Good results cannot be obtained unless the package builds into a strong colony by the middle of June.

Ten days after the package has been installed it should be well established and it is therefore safe to look into the hive. Choose a warm day so as to avoid chilling the brood. Remove an empty comb from the side of the hive and stand it on the ground; then pry the combs over till the brood nest is encountered; lift out the comb and examine the work of the queen. Eggs and larvae—little curved white grubs—should be visible. Where two or three combs are observed to have patches of brood in them it is safe to assume that the hive is doing all right. It is not necessary to find the queen, the less the hive is disturbed the better. During this examination it is well to check the amount of stores in the hive. If there is no sign of syrup or honey in the combs, then the feeder can should be refilled and inverted over the hole in the sack once more.

Should there be no sign of brood or eggs in the hive, then a thorough search should be made for the queen. The chances are she will have been killed. At all events, if she is not producing eggs she should be killed. Order a new queen immediately. Feed the hive and introduce the new queen, by puncturing the candy and hanging the cage, candy-end upwards, between the frames.

There are several different methods of installing packages. The one described above is quite satisfactory.

HIVE MANAGEMENT

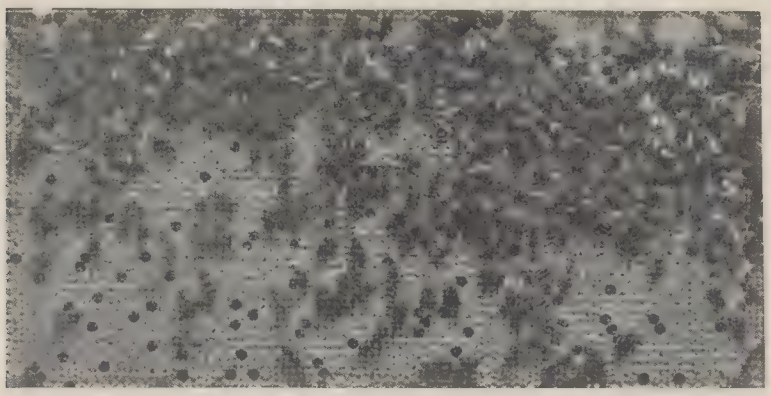
General Principles.

It disorganizes a hive to open it; needless interference should be avoided. There are, however, many good reasons for examining a hive and not to do so at the proper time may produce very poor results. The beginner must acquire a degree of boldness and confidence while avoiding rashness and hasty movements. By the proper use of a bee veil and smoker anyone can usually examine hives without much inconvenience.

It is the object of every beekeeper to operate his hives so that he obtains the maximum number of field bees in his hive at the time of the main honey flow. This flow usually occurs in July in Alberta. It may only last three or four weeks, and unless the hive is at its peak when it begins, a maximum crop is unobtainable. Sometimes the peak is reached too soon by wintered hives; such hives fail to gather a maximum crop.

The best estimate of a hive's condition can be obtained from an examination of the quality and quantity of brood. A colony that has compact brood has a good queen and the bees are

attending to brood rearing properly. The hive that has a spotted brood nest has a poor queen.

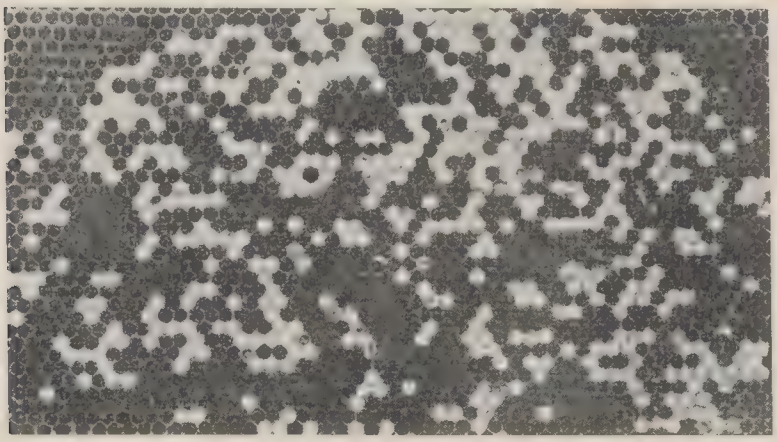


—Courtesy American Bee Journal.

Work of good queen.

A hive, to be a good producer, should have eight or more frames well filled with compact brood by mid-June. Early in the spring and in late summer there may be only two or three small patches of brood.

In order to obtain the necessary strength in a colony for July, ample food, protection against inclement weather, and a good queen are the most important considerations. If the bees



—Courtesy A. I. Root Co.

Work of poor queen.

are not obtaining sufficient nectar from the spring flowers, then sugar syrup must be fed. Artificial wind-breaks can be provided where natural protection does not exist. When a queen has been laying for a week, it is possible to make an estimate of her capacity. Providing she has a good compact brood nest she will probably prove to be satisfactory. If, on the other hand, she

misses many cells and lays irregularly about the combs, she probably is not going to produce a good hive. She should be killed and replaced as directed on page 32.

When a beekeeper is successful in attaining the desired result of having a large number of bees and a well-filled brood nest, he presents himself with another problem—swarm control.

A hive that swarms loses a large number of field bees and consequently never gathers a maximum honey crop. It is the habit of bees to want to swarm when the colony is populous, but more particularly when the hive becomes crowded. The art of achieving populous colonies, yet controlling the swarming instinct, is in preventing overcrowding.

Most systems of swarm control rely on some method of enlarging the brood nest. This allows the beekeeper to have large numbers of bees and many combs of brood, while at the same time reducing the amount of swarming.

It is easier to prevent a colony from developing a desire to swarm than it is to prevent it from swarming once this desire or instinct is aroused. Following the practice outlined below, the least amount of swarming will result.

Spring.

The best practice is to provide the hive with a second brood chamber just as soon as the bees and brood are occupying about seven or eight of the ten original brood frames. In warning, it should be pointed out that the two brood chambers are more difficult for the bees to keep warm than one, so that it is advisable not to put on a second brood chamber until there are ample bees to keep the hive temperature up to the proper level. Brood rearing is analogous to incubating eggs. A temperature somewhat over 93° F. must be maintained by the bees when rearing brood. It is an excellent plan, in order to encourage the bees and queen to ascend into the upper brood chamber more readily, to raise two or three combs of sealed brood from the lower. If this is done the empty combs placed below should be put to the outside of the brood nest and the brood combs raised should be directly over the brood below. The brood nest should not be split up with empty combs in centre. Always keep the full number of combs in the brood chambers.

Summer.

Once the honey flow is well under way, there is very little trouble from swarming. The important work for the beekeeper is providing supers for the storage of honey. A good hive of bees will sometimes draw out ten combs of foundation and fill them with honey in a week. It is advisable to keep a close watch on hives during a honey flow because failure to provide supers when needed will result in loss of honey. During a heavy honey flow a super should be given when the preceding one is half-filled. Some beekeepers put on two or three supers at the beginning of the flow, then merely check up later. Empty supers are placed on top of the hive.

When foundation is used, ten frames are put into supers. When drawn combs are available only nine combs are put in a super. Nine combs equally spaced in a super will contain just as much honey as would ten, and they are easier to uncap at extracting time.

Ample super space should be available during a honey flow. When nectar comes in from the fields it may contain from 30% to 70% of water, and will occupy more space than honey having only about 16% water. Then again, in order that the bees may reduce this water content—ripening it—it must be distributed, a little in each cell.

Ventilation.

During hot weather bees may be observed clustered at the entrances of the hives. It is often advisable either to stagger a super slightly or put a chip under the hive cover to allow better ventilation. Besides aiding in cooling the hive, this extra ventilation will assist the bees in ripening the nectar, because their method of doing this is largely by fanning warm air currents through the hive. When the honey flow has ceased this extra ventilation should be closed to prevent robbing by other bees.

Removal of Honey.

As supers become filled with honey and the combs are capped, they may be removed from the hive and extracted.

Honey to be marketable must be well ripened. It is considered sufficiently well ripened if combs have been about two-thirds or more capped over by the bees. To be No. 1 according to the Dominion honey grading standards, there must not be more than 17.8% of water in the honey. Most Alberta honeys when two-thirds or more capped, are well within this limit.

Using plenty of smoke the combs may be picked out of the supers one by one and most of the bees shaken off with a quick jar and the balance brushed off in front of the hive entrance. A goose wing or brush dampened by dipping it in a pail of water, works satisfactorily.

The removal of honey by this method is usually an unpleasant procedure. The bees are cross and the weather is hot. Another method, less painful though slower, involves the use of a bee-escape board. A bee-escape can be purchased or made and set in a board. This bee-escape board is placed beneath the supers it is intended to remove. Three or four supers can all be piled above one escape board. Care must be taken to see that there are no cracks or spaces large enough for bees to enter between the supers or under the lid when they are placed above an escape board. When the bees from inside have found their way through the bee-escape and down into the hive, the supers are left without any guard bees, and, in consequence, likely to be robbed by other bees. If there is any brood in the supers

above the escape board the bees will not go down. Ordinarily, the bees will vacate the supers in twenty-four to forty-eight hours in warm weather.

Before the honey can be removed from the comb it is necessary to shave the wax capping from it. This can be done with a sharp butcher knife which has been well heated in boiling water. Two knives are sometimes used; one kept in the water while the other is in use. They cool quickly and do not work so well when cool. Steam heated knives are available from the bee-supply manufacturers.

The uncapped combs are put in an extractor; the reel is whirled until the honey is thrown out by centrifugal force.

Preparation of Honey for Market.

The most important rule to be observed in preparing honey for market is to have it clean and in clean containers. Incident to the process of extraction, broken comb and flakes of wax invariably get into the honey. These specks must be strained out. Though they do not really constitute dirt, the purchaser takes very strong objection to them.

Honey allowed to stand after extraction will develop a foam consisting of air bubbles on its surface. It will also have a large proportion of wax specks floating on its surface. This scum, developing on the surface of cans and when speckled with wax scales, makes an unattractive looking article. It is recommended, therefore, to allow the honey to stand in a tank for two days, then skim it before the cans are filled.

Straining can be accomplished by passing the honey through a cloth called "butter cloth." Cheese cloth does not do a good enough job of straining. If the cloth is made in the form of a bag and hung in the honey tank it works much better than if stretched over the top of a tank and the honey merely poured through it. It should be dampened by wringing it out in clean water before using. This starts the flow of honey through it.

Our laws require that all honey sold shall be in a container marked with the weight of honey in it and the name and address of the packer and the word "honey."

Cleansing Supers and Combs.

The combs, when empty, should be returned to the supers. They will be wet and sticky with honey. If there is a honey flow still in progress, they can be given back to the hives in the ordinary manner to be filled again with honey. If the honey flow is finished, it is well to put them above the escape board, having removed the escape. The bees from below will come up through the hole and rob the combs, licking them clean and carrying the honey down to the brood nest. To obtain results in doing this, the weather must be warm enough that the bees are active. Given good weather, the combs will be clean and dry in two or three days, when the supers are removed and stored until required the following season.

Fall.

If the hives are to be wintered, the brood nests are filled with heavy combs of honey replacing partly filled or empty ones. The partly filled combs and those that are not required for feed are extracted. About the middle of October a final check on the stores in the hive should be made. If there is not forty or fifty pounds of the best quality honey in it, there is not enough. Full combs of honey may be given to replace empty or partially emptied ones, or a syrup made of two parts of sugar dissolved in one part of hot water (cold water will not dissolve sugar in this proportion) can be fed in feeder pails to make up the deficiency.

Colonies being wintered outside should be packed about mid-October (see wintering, page 26). Colonies being wintered in cellars are brought in early in November. Protection against mice should be provided in all cases. (See page 32.)

If the colonies are to be destroyed before winter, the queens should be caged three weeks before the end of the honey flow. This is usually done about the tenth day of August. Then from five to ten days later any queen cells that have been started should be destroyed. This procedure is followed so that there will be no brood in the hive when it is gassed at the end of the season. It is better to cage the queen than to kill her; a queenless hive seems to become demoralized and in consequence does not continue gathering honey as rapidly as a queen-right hive. And again, if the queen cells are not destroyed, a virgin will hatch, be mated, and begin a new brood nest.

The colony is killed with calcium cyanide or a commercial preparation of it called "Cyanogas." (See "Killing Bees," page 32.) Dead bees are brushed and shaken out of the hive.

The brood chamber containing two combs of pollen and four or five combs of honey, should be stored in a dry place and protected against mice. It is then in first-class shape to receive a package the following spring.

MANAGEMENT CALENDAR

The dates given are very approximate. There may be several days variation, depending on season and on geographical location.

WINTERED COLONIES	PACKAGE COLONIES
End March:	
1. Remove hives from cellar. 2. Provide wind-breaks for such hives.	
End April (A warm day when bees are flying):	
1. Examine for disease (see page 35). 2. Unite queenless colonies (see page 30). 4. Feed if necessary (see page 14).	1. Prepare hives for packages. 2. Install package (see page 14).

MANAGEMENT CALENDAR—Continued

WINTERED COLONIES	PACKAGE COLONIES
Mid-May (During dandelion bloom):	
1. Outside-wintered colonies unpacked. 2. Enlarge brood nests of strong colonies—double brood chambers. 3. Inspect for disease. 4. Increase may be made from strong hives. 5. Feed if necessary.	1. Feed if necessary (see page 14). 2. Add second brood-chamber to strong colonies.
Mid-June (Just before the main honey flow):	
1. Demaree strong colonies (see page 25). 2. Add supers. 3. Unite weak colonies (see page 30).	1. Demaree strong colonies. 2. Add supers. 3. Unite weak colonies. 4. Inspect for disease.
End July (Near end of main honey flow):	
1. Extract honey, giving empty supers back to colonies. 2. Re-queen colonies (see page 31).	1. Extract honey, giving supers back to colonies.
Beginning of August (Three Weeks before end of late honey flow):	1. Cage queens.
5 - 8 Days Later:	1. Destroy queen cells.
End of Late Honey Flow: 1. Fill brood nests with combs of honey for winter stores. 2. Finish extracting.	1. Kill colonies (see page 32). 2. Extract surplus honey. 3. Store brood nests.
Mid-October: 1. Feed where necessary. (Single brood-chamber hive complete should weigh 75-85 lbs. Double brood - chamber hive complete should weigh 95-110 lbs.). 2. Pack colonies to be wintered outside (see page 28). 3. Put cellar-wintered colonies in cellar early in November (see page 28). 4. Protect against mice (see page 32).	

SWARMING AND ITS PREVENTION

It is the instinct of bees to swarm. It is a form of increasing and dispersing the species. From the beekeepers' point of view this characteristic is most undesirable and constitutes one of the major problems, for a hive, when it swarms, loses from half to three-quarters of its bees. And furthermore, during the eight days or so when preparations for swarming are under way,

the gathering of nectar practically ceases; the bees seem to loaf. These two features may render a hive unproductive of honey.

The main factor which determines a colony to swarm, is a crowded condition in the hive. This does not mean that to have plenty of supers on a hive will keep it from swarming. There can be ample space in the hive and a crowded condition can still exist in the brood chamber. The bees will sometimes have barriers of honey confining the brood nest; they may be slow to expand onto foundation; there may be a great many nurse bees — bees that have not yet become field bees; the weather may be so inclement that field bees are confined to the hive. All of these conditions are conducive to producing what is called the swarming fever. Once the swarming fever is established in a hive, it is difficult to prevent swarming.

Generally, by giving a double brood chamber, by supplying empty combs in the brood chamber, even by lifting some combs from a full brood chamber and placing them in a super, and by giving ample super space, the swarming impulse is greatly reduced. These manipulations should be part of the regular work during the spring management of hives.

In spite of following the suggestions outlined, some hives will persist in swarming. Such hives must receive more drastic handling in order to keep them intact and busily gathering nectar.

Swarming may occur any time from the middle of May to the second week in July, though it is usually more common from the middle of June to the first week in July.

There may be no exterior signs by a colony that is preparing to swarm, though sometimes the bees will be seen clustered at the entrance and but few field bees will be at work. Bees quite often cluster at the entrance in hot weather, particularly in the evenings, when the colony has no intention of swarming; such clustering may be caused by insufficient ventilation (see page 20 on ventilation). An examination of the brood nest of a colony is the only reliable means of discovering whether or not it is about to swarm. Before a colony swarms it builds several queen cells. These cells are usually built at the sides of the combs or at the top or bottom; at all events there will be six or more—sometimes thirty. When these cells are completely capped over, the colony will leave the hive, unless the weather is unsuitable, then it will wait for a good day.

Swarm Preventing.

To prevent a hive from swarming, one of the following principles is applied. They are both equally effective, though the separation of the queen and brood is probably the best method: —(a) Removal of the queen; (b) Separation of the queen from the brood, which is usually called "Demaree" method of swarm control.

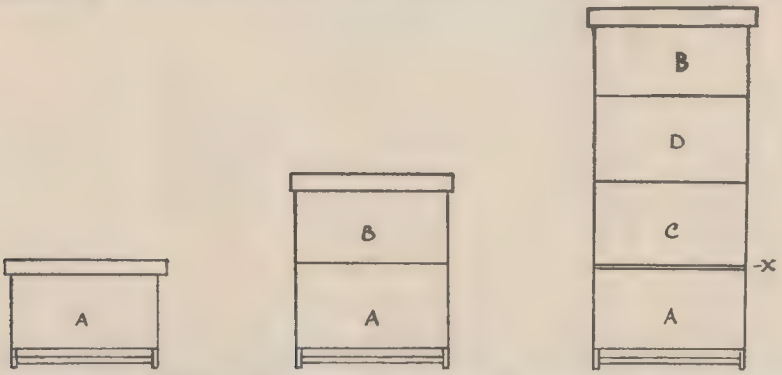
(a) **Removal of the queen:**—The queen is found and either killed, or is put in a new hive, together with two or three frames of brood and young adhering bees, to start a fresh colony;

then all the queen cells in the hive are destroyed. To make sure that all the cells have been discovered, it is necessary to shake most of the bees off the brood combs—sometimes the cells are in obscure corners and might be missed. If cells are left in the hive it may swarm when the first young queen emerges.

It is probably advisable to give more ventilation and enlarge the brood nest or add a super so that any possible over-crowding is prevented. Eight to ten days later, any queen cells that have been started are destroyed and a new laying queen is introduced (see pages 31 and 32). Sometimes the queen with the two or three frames is returned to the hive after it has been queenless from ten to fourteen days.

(b) **Separation of queen and brood (Demaree method of swarm control):**—The chief advantage in this method is that it keeps the colony intact and in full working order. To demaree a hive, all but one or two combs of brood are placed in a new brood chamber. The old brood chamber is filled with empty combs. The new brood chamber is placed on top of the hive with one or two empty supers between it and the lower brood chamber. Care must be taken to find the queen and leave her in the lower brood chamber. It is usual to cut out all queen cells when this manipulation is performed and five to eight days later again destroy any that may have been produced in the upper brood chamber.

Some commercial beekeepers follow a system of providing ample room in the brood chamber by raising combs of brood during the early part of the season and, when signs of swarming begin, they examine the colonies every eight or nine days and cut out all queen cells. This regular examination continues until signs of swarming cease, probably after three such manipulations.



1.—Colony in Spring; 2, Strong colony with double brood chamber; 3, Demareed colony. (A. contains queen, one or two combs of unsealed brood, and empty combs; B. contains combs of brood; C. and D. supers of empty combs; X. queen excluder).

A Swarm.

Under natural conditions, the old, or original queen of a hive goes with the first swarm. In order that the hive be not left queenless, several queen cells are produced by the bees before

the swarm leaves. It sometimes happens that when these cells hatch four to eight days later, more swarms will issue with virgins until the hive is so weak it will swarm no more.

When a swarm issues from a hive it will cluster a short distance away. It may stay clustered for half an hour, though more often half a day, and sometimes three days. It is awaiting news from scouts that have been sent out in search of a new hive. It should be captured before this news gets back or it will disappear.

A swarm may settle on a variety of objects. If on a limb of a tree that can be cut off and carried over and placed before the entrance to the new hive, no difficulties are presented; but if on a fence post or corner of a building, it may be necessary to brush the bees off into a box or wash boiler, or they may be scraped off with a piece of cardboard into a box held beneath the cluster. When most of the bees are in the box it should be covered and carried over to the hive. The bees are then shaken out in front and allowed to run in or are shaken right inside the hive. This process may have to be repeated two or three times in order to collect most of the bees.

Usually once the queen has been taken to the hive, the swarm will stay. Crushing any bees should be avoided as this makes them cross. A swarm that has been clustered for two or three days is likely to be a little cross and should be treated with circumspection.

A swarm will not stay in the hive unless the queen is with it. Sometimes it will come out and cluster a second time even when the queen is present. In such cases, the bees should be shaken out onto a piece of paper in front of the new hive and a search made for the queen. When she is found, she should be caged and put in the hive. She may be released in two days.

WINTERING

Colony.

Bees can be wintered in either single or double brood chambers. A colony that occupies only about six frames, when bees are partly clustered as on a cool day, should be wintered in a single brood chamber. A colony that is much stronger should be allowed two brood chambers.

Food.

Every colony to be wintered should have at least forty pounds of well ripened honey or sugar syrup. Eight well filled standard combs should contain the necessary quantity of food. In the case of colonies wintered in double brood chambers, the upper one, which is also called a food chamber, should contain the forty pounds. If the lower brood chamber also has honey in it, all well and good. Bees will move up into the food chamber during the winter and might starve in it rather than descend to the lower chamber. In addition to the honey, there should be the equivalent of two or three combs of pollen in the hive.

If sugar syrup is to be fed, this can be accomplished by perforating the lids of honey or jam tins with ten or twenty small nail holes. These tins are inverted over the frames of the hive. The bees can suck the syrup through the holes and store it in the combs.

The syrup is made up with one-third of hot water and two-thirds of sugar. Cold water will not dissolve the sugar. The syrup may be fed when warm. Feeding should be done during the first two weeks of October, while the bees are still active.

Feed Can.

Bees.

The bees going into winter must be young. Unless a hive has had brood in it during the latter part of August and September, there will be but few young bees. It is a waste of effort to try to winter old bees. They may survive the winter, but will dwindle badly in the spring.

Young bees are most easily obtained by introducing young queens in late July. A young queen lays more eggs in the fall than does an old one. A young queen has the further advantage of being more prolific the following spring. An old queen may die early in the spring, though some of them are just as good the second year as they were the first.

Kootenay wintering case.

Protection.

Bees need protection against cold. They have their methods of generating heat but need assistance in conserving it. The essentials are dryness, quietness, and avoidance of sudden changes of temperature.

In a Cellar.

In a cellar, the temperature best suited is between 38° and 43° F. A dry, dark cellar where there are no mice or other disturbances, kept between these temperatures would be satisfactory, but the temperature should be watched; thermometers are cheap. It is very important that the cellar remain dry and the air fresh.

Hives are put into cellars early in November. They are put outside again the following April or when the bees seem restless.

Outdoor Wintering.

Outdoor wintering usually proves more satisfactory than cellar wintering. Very few cellars are fit for wintering bees. There are times when the weather is fit for flight and it does bees good to fly a little.

A wind-break and some means of insulating the hive are necessary. Insulation can be provided with three or four inches of fine, dry straw or wood shavings. This insulating material can be held in place with water-proof or tar paper, or a wooden

packing case. If tar paper is used, it can be held in place by tying with twine. Insulating material must be kept dry. Only a small opening (3/8"x2") through the packing case or tar paper is allowed as a flight hole.

A tunnel must be made over the hive entrance so the insulating material cannot block it; the hive entrance, though it may be covered with snow, must always be wide open. The lid of the hive is removed and replaced by a sack sufficiently filled with the insulating material to make a cushion about ten inches thick on top of the colony. A queen excluder or two or three

Steps in packing a hive in tar paper: 1.—Bridge over entrance; hive on a square of tar paper to keep it dry. 2.—Cover replaced by cushion of fine straw. 3.—Collar of tar paper made by pinning the two edges with nails; lath tacked to bridge; fine straw being pushed around hive. 4.—Tar paper secured with twine and small entrance made by poking a hole in tar paper.

sticks are placed under this cushion so bees can pass over the frames beneath it. A top entrance is preferable for outdoor wintering.

Protection against mice must be provided. Poison grain (see page 32) where other stock cannot reach it, is effective. A snowdrift over the hive gives added protection.

UNITING HIVES

Hives that for some reason or other nave failed to become strong by the middle of June should be united. A weak hive at this time of the year will not gather any surplus honey. A hive would be considered weak when it only had five to six combs of brood and bees in mid-June.

In order to avoid fighting amongst the strange bees when uniting, the following system is employed:—

First remove the cover of one of the hives to be united and replace it with a single sheet of newspaper; second, carry the weak hive over, after removing its bottom board, and place it on top of the newspaper. The bees will gradually gnaw through the paper and unite without fighting. One of the queens will be killed by the bees.

INCREASE

Making Increase Before Honey Flow.

It should be remembered that to make increase from any but extra strong hives (eight to ten combs of brood and bees) will be at the expense of the honey crop; a weak hive will not regain its strength in time for the honey flow.

Not later than the middle of May strong colonies with ample brood can be split up into two hives, or two hives may each have part taken from them and these parts united to make a third hive. Unless hives that are very strong at this time are divided, they may persist in swarming. They seem to be past their best before the flow begins and fail to gather as good a crop as a hive that has just built up to maximum strength when the flow starts. A hive weakened too much by making increase from it, or a weak increase will be a complete failure.

Prepare a brood chamber of ten drawn combs, a hive cover, and bottom board. Place the new hive beside the strong colony. Find the queen in the strong colony and set the comb on which she is found to one side. Remove five combs well filled with sealed brood and containing some pollen, honey, and adhering bees. Exchange these combs for five of the empty ones from the new hive. Carry the new hive to its position in the apiary, and reduce the entrance, finally stuffing it with fresh grass. When the fresh grass wilts the bees will gnaw their way out and be able to fly from this increase. Temporary confinement prevents some of the bees that would fly straight back to the parent hive, from doing so.

Three days later, go to the increase and cut out all the queen cells and introduce a laying queen (see page 32).

It must be remembered that many of the field bees put in the increase will go back to the parent hive. It is necessary, therefore, to make sure the increase has honey and pollen enough to enable it to carry on brood-rearing until it has developed its own field force.

Making Increase for Wintering.

Another time to make increase is about the middle of July. Such increase will not gather any surplus honey in the current year. It will often build up and be in good condition for winter and a producer the following year. Increase made at this time need not be quite so strong as was necessary with the increase made before the honey flow. Nor need a laying queen be introduced. It can be allowed to produce its own queen from a queen cell, ready to hatch.

Three good frames of sealed brood, pollen and honey, adhering young bees and a good queen cell, are the requisites of this late increase.

Brood removed from a hive the middle or latter part of July will not interfere with its honey gathering to any appreciable extent unless there should come an unusually heavy flow in August.

Brood removed as a swarm control measure could be set aside on a new stand and used for increase. In any event, the entrance must be stuffed with fresh grass and food provided, otherwise the increase will not make any progress.

RE-QUEENING

Any colony having lost its queen and having worker (fertile) eggs or larvae not more than three days old, can raise a queen for itself. The bees feed a young larva "royal jelly" and the cell is enlarged into a queen cell. Assuming the bees select a larva that is already three days old, then a virgin will hatch within eleven days. She will be mated from the fourth to the tenth day and begin laying three or four days later. Thus it will be about twenty days before the colony has any fresh brood and another twenty-one days before any young bees emerge.

This time can be reduced by giving a hive a queen cell ready to hatch, or better still, by giving the hive a laying queen.

Knowing these facts, it can be understood why it is usually unprofitable to allow a colony to raise its own queen; the season would be nearly over before a field force of bees was available to gather honey should the queen disappear in the spring.

To receive a queen a hive must be queenless. With few exceptions a colony will not tolerate more than one queen. Therefore, any hive into which a queen or queen cell is placed, must be without a queen and without queen cells of its own. A hive that has neither queen, queen cells, nor larvae less than three days old from which it could raise a queen, is called

"hopelessly queenless." Such a hive, unless given a queen, will probably produce laying worker bees that lay only drone eggs, and, as a result, will die out.

Introducing Queens.

Queens may be purchased from bee-supply houses. They can be sent through the mail in small cages. To introduce a queen successfully there must be no laying workers and it must be queenless though it need not be hopelessly so. The usual procedure is to remove the covering over the candy plug in the cage in which the queen arrives, poke a match through the candy, not making the hole large enough for the bees and queen to escape, and place it on or between the frames of the brood chamber. The bees will liberate the queen by eating out the candy. She should be laying eggs within three days.

A queen is more readily accepted when there is a honey flow in progress. It is sometimes a help in having a queen accepted, to feed the colony when introducing a queen if there is no honey flow in progress. She is more readily accepted if the hive has not been queenless more than a few hours.

The surest method of introducing a queen is to prepare a nucleus of two frames of sealed brood and adhering young bees. Introduce the queen by the cage method to this nucleus. Then a week later, when she has been laying eggs, quietly place the whole nucleus in the queenless hive. The queen being kept between the two frames of the nucleus is well protected by her own bees and will not be molested.

KILLING BEES

The simplest method of killing bees is with a commercial preparation called "Cyanogas." This is a gray powder largely composed of calcium cyanide. The calcium cyanide gives off a very poisonous gas. A tablespoonful of this gas placed on a card and pushed into the entrance of a hive will kill the bees in a few minutes. The honey is not affected by this gas, though the powder must not come in contact with it nor should the honey combs be exposed to it for longer than is necessary to kill the colony.

Cyanogas is absolutely deadly to humans as well as to bees. Great care must be exercised when using it. The container must not be opened indoors nor must the fumes be breathed when it is being used.

PESTS

Mice.

Mice destroy stored combs and kill hives during the winter. Combs should be stored in supers carefully stacked, without chinks between them and with tight lids or metal queen excluders above and below each pile.

Poison is effective if distributed where mice are likely to bother hives and equipment. A poison can be made by dissolving 15 grain (1/3 teaspoon) of strychnine in 1 pint of water; then

thoroughly soak some wheat in this solution and spread it out to dry. This poison should be placed so poultry or live stock cannot eat it. It can be put in used tins lying on their sides. The openings to these tins can be squeezed so small that only mice could reach the grain.

Ants.

Ants are sometimes troublesome around the hives. Their nests can be destroyed by pushing a stick (about the size of a broom handle) down ten inches into them, making three or four holes in each nest; then a spoonful of carbon bisulphide is poured into each hole and a sod or piece of paper put over the hole to prevent escape of the gas that forms.

Cyanogas (see page on killing bees) can be used instead of carbon bisulphide. A small spoonful of cyanogas is sufficient. It is very poisonous to humans and the can must not be opened indoors, nor must the fumes be breathed.

If the nests are not easy to locate, a syrup made as outlined below will be effective.

Water .....1 pint	Arsenate of Soda.....125 grains
Sugar .....1 pound	Honey .....1 tablespoon

Boil the first three ingredients till the arsenate of soda is dissolved, then add the honey. Punch holes in the top and sides of cans of suitable size, with a spike. Soak bits of sponge, excelsior or bread in the poison and put in the cans. Then put on covers. Place these where it is convenient for the ants. If too much poison is added to the syrup the ants will not take the syrup. This is a slow acting poison, and will be carried to the nest and fed to the ant larvae and queen.

Skunks.

Skunks are sometimes very troublesome in apiaries. They scratch at the entrances to the hives and when the bees come out to sting them they eat the bees. They not only consume a great many bees but they so enrage the colony that the beekeeper, when he comes along, receives a great many undeserved stings.

The indication that a skunk is around can be observed by the grass being pawed or scraped at the entrance to the hive, mud on the entrance and black excreta in which parts of bees can be distinguished.

An egg opened at the large end and having strychnine, (an amount about equal to a small match-head), stirred into it and placed at the entrance to the hive, will kill the skunk. Care must be taken that dogs or other creatures do not have access to this poisoned egg.

Moths.

The Greater Wax Moth and the Mediterranean Flour Moth both work on combs stored in warm places. The former is very

destructive of combs if allowed to go unchecked. The latter eats pollen and leaves webs on combs but does not usually do much damage.

The simplest method for controlling these moths is to store combs in buildings that are not heated. Prolonged freezing kills the larvae of these moths.

BEES-WAX

Bees-wax is a valuable by-product of the apiary. Cappings off honey and broken and drone combs should be saved and melted down into cakes of wax. These cakes can be shipped to bee-supply houses for making into foundation or sold outright to manufacturers who advertise in bee journals.

Rendering Wax.

The wax from cappings has probably a little honey mixed with it and can be more efficiently rendered into cakes of pure bees-wax than can old and broken combs. Cappings should therefore be kept separate. To render cappings, soak them, stirring occasionally, for about twenty-four hours in a tank of water. This dissolves out all the honey. Drain this water off into a sewer or hole in the ground where it can be buried. This sweetened water may make the bees rob and it is dangerous in case of disease. Then add more water, preferably soft, and heat the tank, stirring occasionally, until the wax melts. The molten wax can be skimmed off the top; it floats like fat. It is poured into sloping sided containers (lard pail, bucket) and is allowed to cool slowly.

To render old combs and wax refuse, the combs should be cut out of their wooden frames and all the refuse put into burlap sacks. These sacks should be immersed in a tank of water for twenty-four hours and prodded occasionally to make sure they are getting well soaked. They need to be weighted down in the water. This water is drained off and disposed of as mentioned above. Then soft water is added and they are thoroughly boiled. The wax can be skimmed off the top and allowed to cool slowly in containers with flaring sides.

By way of warning, when boiling old combs and wax, the tank should not be more than three-quarters full. It may boil over if it is too full and if it does, a bad fire will result. Never leave a big fire under the tank. Rendering wax in iron tanks will darken the wax; tin or copper tanks do not.

The above methods are the simplest. They are also inefficient. There may be as much as 25% of the wax still in the slum gum in the sack. For more efficient methods reference should be made to books. A wax press and its use is described in "ABC & XYZ of Bee Culture," by A. I. and E. R. Root.

BEE DISEASES

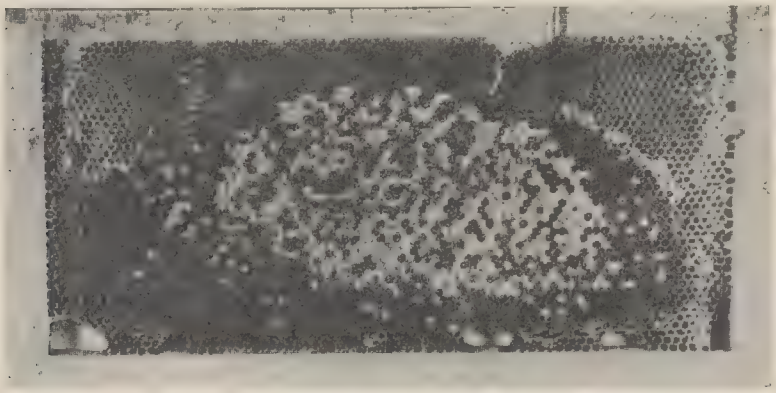
There are two main classes of bee diseases—those affecting adult bees, and those affecting the brood.

The adult bee diseases in this country are seldom seen, and, fortunately, no serious cases have been found so far. A discussion of these diseases is therefore omitted. A beekeeper is advised, however, to report cases and send samples of bees to the Apiculture Branch, Department of Agriculture, should he suspect disease. This precaution is advised so that should an outbreak of disease occur, steps may be taken at once to curb it, should it prove of a malignant type.

The symptoms of most adult bee diseases are rather similar. The bees lose the power of flight; they may be observed climbing up blades of grass; crawling about the entrance; abdomens extended and trembling; having difficulty in walking and unable to fly.

There are several diseases affecting brood. The three most commonly seen in Alberta are American Foul Brood (A.F.B.), European Foul Brood (E.F.B.), and Sacbrood.

Of these three diseases, A.F.B. is by far the most serious. It kills the colony; there is no cure for it and it is readily spread from hive to hive and apiary to apiary. **The Bee Diseases Act** is designed specifically to assist the beekeeper in keeping clear of this serious menace.



—Courtesy American Bee Journal.

A diseased comb (A.F.B.)

Symptoms.

The gross symptoms of any brood disease are discoloured larvae, dark cappings, irregular brood (many empty cells scattered about the comb), punctured cappings and sunken cappings. A careful examination of the larva in a suspected cell will often give a correct diagnosis of the particular disease.

By comparing the dead larvae with the symptoms of the three diseases listed here, it is usually possible for a beekeeper to diagnose his trouble.

Diagnosis.

	A. F. B.	E. F. B.	SACBROOD
Cappings	Many sunken, dark and perforated; scattered.	Usually none. When larvae die in advanced stages there may be sunken, greasy, punctured cappings.	Many uncapped; some perforated.
Time of Death..	During grub or prepupal stage or within two days after transformation to pupa.	Before change to pupa. Generally quite early and before capping. Advanced larval stages may be capped.	Before change to pupa. After capping.
Position in the Cell	Straightened out, regular and uniform. Occupies most of the lower cell wall. Posterior, or hind end, extending up back wall of cell.	90% of cases curled or twisted in the cell and in unnatural positions. 10% in advanced larval stages fairly regular and extended in the cells.	Uniform shape and position in cell with head end curled up.
Colour Changes	From light yellow-brown to dark coffee-brown. Uniform throughout.	From greyish-yellow to dark greyish-brown. Not uniform.	From light yellow-grey to dark brown. Head end much darker than body.
Appearance of Pupa	Same process of decay as larva, tongue extending upwards.	None die.	None die.
Consistency	Soft mass. Strings out smoothly when probed.	Somewhat sticky. Comes out lumpy when probed.	Lifts out like small sack when probed, unless the skin is broken, then it is watery.
Tracheae	Not visible.	Often plainly visible as fine cross lines.	Not visible.
Odour	Odour of heated glue, in advanced stages.	Fishy odour in advanced stages.	No odour.
Scale	Hard, dark uniform scale. Adheres tightly to cell.	Rubber-like, irregular, shrivelled, dark brown scale. Easily removed.	Black, roughened, curled up at anterior or head end; can be picked out.

If the beekeeper entertains any doubt about a suspicious case, he should take a toothpick or match, stir it in the remains of the cell and make a smear on a piece of paper (not newspaper, that is too absorbent), put his name and address on the paper, and send it in an envelope to the Apiculture Branch. Department of Agriculture, Edmonton. The hive from which the smear has been taken should be marked. A correct diagnosis of the trouble will be made under the microscope and the treatment necessary, (if any), will be recommended.

American Foul Brood.

This disease is caused by a bacteria called Bacillus larvae that can exist in a spore form in honey. When honey containing the organism is fed to brood, the disease develops.

Treatment.

The treatment for American Foul Brood is to kill the colony with Cyanogas, dig a hole about 1½ feet deep and 2 feet in

diameter, start a fire with some brush, carry the colony close to the fire and burn all the combs and bees. When everything is well burned, the ashes are covered over with earth. The hive cover, bottom board, queen excluder, and supers are scraped clean of wax and propolis and thoroughly scorched (slightly charred) either by sprinkling gasoline on them and lighting it, or by a blow torch. They can be treated by boiling for thirty minutes in a vat containing lye water (1 can of lye to each 5 gals. of water). This latter method is less efficient than scorching.

Prevention.

This disease is spread through spores of the bacteria getting into the honey. When such honey is fed to larvae, the disease develops. Since bees are prone to rob any hives weakened or dead of disease, or any equipment stored in a building that is not bee-tight, the disease is readily spread. Every hive that contracts this disease obtained it from some exposed source. By reporting the disease at once, the Department can make a thorough inspection to locate the source and destroy it.

Early attention to cases of disease, if it should be American Foul Brood, is essential if serious loss is to be avoided.

The Bee Diseases Act specifically states that no bee equipment should be moved more than a mile without the permission of an inspector. This is to prevent the sale of used bee equipment or moving equipment that might be diseased. Purchase of used equipment is one of the surest ways of obtaining disease, unless it can be established that the equipment is clean.

In order that the Department can give the fullest protection to beekeepers and carry out inspection for disease properly, all beekeepers are required to register on the forms sent out every year. If a beekeeper does not receive a form he should write for it. Anyone not registering is liable to prosecution under The Bee Diseases Act.

Registration forms and permits to sell or move used bee equipment can be obtained by writing to the Provincial Apiarist, Department of Agriculture, Edmonton.

European Foul Brood.

This disease is caused by a bacteria that is probably spread by contact with bees. It is not usually considered a serious disease, though occasionally it is. When a colony is thrifty it will generally disappear.

Treatment.

Quite often the disease will disappear of its own accord when a colony begins to build up. If the disease persists and gets worse, the following treatment should be given:

Good Italian bees are able to arrest this disease and clean

it out of the hive. The cure then, is to re-queen the hive with a vigorous young queen of Italian strain.

Sacbrood.

This disease is usually found only in unthrifty colonies. No organism causing this disease has been discovered.

Treatment.

See that infected colonies are supplied with pollen and honey. Do what is possible to strengthen them; perhaps give a frame of emerging and young bees from another hive. If the queen does not seem to be laying properly, re-queen it. The disease usually disappears as the colony builds up.

MISCELLANEOUS INFORMATION

Laying Workers.

Worker bees sometimes begin to lay eggs when a hive becomes hopelessly queenless and remains so for three or four weeks. The eggs are generally scattered here and there in the brood nest and sometimes laid on the side of the cell wall instead of at the bottom of the cell. They will develop into drone bees because the worker is never mated. A hive with laying workers in it will kill any queens introduced by the cage method. The only method for re-queening such a hive is the nucleus method explained on page 32.

Drone Layers.

A queen is called a drone-layer when she lays eggs that produce only drone bees. It sometimes happens that an improperly mated queen or injured queen becomes a drone layer. She must be replaced. (See page 32).

Supersedure.

A colony will sometimes replace its queen. A young queen will be reared and will supersede her mother. Occasionally a mother and daughter are found in the same colony, both laying eggs. It is generally supposed that the bees, on recognizing the queen to be defective in some particular, take steps to replace her while she is still producing worker eggs.

Supersedure is recognized when three or four good sized cells are seen in the brood nest. They are unlike swarming cells in that there are seldom more than eight, more often only two or three (when preparing to swarm, a colony generally has more than this number of cells), and they are likely to be in the centre of the brood nest (swarming cells are usually at the edges).

A superseding colony should be watched to ensure that it does not become queenless. This condition might arise if the parent queen died and the young queen failed to return to the hive after mating. A new queen can be purchased and introduced if the hive becomes queenless.

Drawing Out Combs.

Bees make much better combs from foundation when it is drawn out in the supers than when it is drawn out in the bottom brood chamber.

A high temperature, over 90° F., is necessary for wax secretion and comb building. The difficulty of maintaining this high temperature near the floor of the hive nearly always results in weak combs that are unattached to the bottom bars of the frames.

Ideal conditions for obtaining well drawn combs are obtained by having the foundation drawn out in upper brood

chambers or supers when a good honey flow is in progress. If, as is necessary when beginning with bees, foundation must be put in the brood chamber, then ample food must be provided so that the bees can elaborate the wax for comb building.

Pollen-Bound Combs.

Good worker combs that become pollen-bound or pollen-clogged need not be melted down. They can be submerged and weighted down to soak in a tub of water for twenty-four or forty-eight hours. They are then whirled in the extractor or shaken to remove the surplus water and spread out to dry or spaced in a super so they are exposed to the air. When dry it will be found that the pollen pellets are shrunken and can be shaken out of the comb by gently tapping the edge of the frame. Those pellets that do not come out readily will be removed by the bees when the combs are put in a hive.

Drone combs or damaged combs that become pollen-bound are better melted down and the wax rendered from them and sold or shipped to a manufacturer to be made into new foundation.

Dead Bees in Combs.

Bees that die in the combs in winter are often deep in the cells and difficult to remove. If such combs are dry they can be placed in a hive and the bees of the hive will drag out the dead ones and clean up the combs.

Mouldy Combs.

Combs that become damp sometimes accumulate mould. Placed in a warm sun the combs will dry. Surplus mould can be brushed from them. Such combs will be accepted and cleaned up by the bees.

Any combs that are very bad will have a putrid odour. These latter ought to be melted down and the wax salvaged.

Publications.

Dominion Department of Agriculture, Ottawa, Ontario—

"Bees and How to Keep Them."
"Wintering Bees in Canada."
"Package Bees."
"Honey, and Some Of the Ways in Which It May Be Used."

Books—

"A.B.C. and X.Y.Z. of Bee Culture," by A. I. and E. R. Root.
"Beekeeping," by E. F. Philips.
"Starting Right With Bees," by H. G. Rowe.
"How to Succeed in Bees," by Atkins and Hawkins.
"First Lessons in Beekeeping," by C. P. Dadant.

Bee Journals—

"Western Canada Beekeeper," Winnipeg, Manitoba.
"Canadian Bee Journal," Oshawa, Ontario.
"Gleanings in Bee Culture," Medina, Ohio, U.S.A.
"American Bee Journal," Hamilton, Illinois, U.S.A.

Beekeepers' Association.

There are many district beekeepers' associations. These associations hold meetings and discuss problems in beekeeping. They often handle package bees and equipment, obtaining better service and prices than could individuals.

These district associations affiliate and comprise the Alberta Beekeepers' Association which deals with important issues such as advertising, representing the beekeepers' interests to the government, issuing information on marketing, and many more necessary services.

Department of Agriculture.

The Apiculture Branch is responsible for the operation of The Bee Diseases Act. Without effective control of bee diseases, beekeeping would have to be discontinued.

Experts are available to give instructions, hold demonstrations and advise beekeepers in their problems. Correspondence on beekeeping problems should be addressed to the Provincial Apiarist, Department of Agriculture, Edmonton. Many District Agriculturists are active in bee work. All of them will be glad to give what help they can.

For information on the use of Honey, enquiries should be addressed to the Agricultural Extension Service, Parliament Buildings, Edmonton.

ALBERTA
DEPARTMENT OF AGRICULTURE

PUBLICATIONS

Bulletin 1—Turkey Raising in Alberta.
Circular 2—Equine Encephalomyelitis.
Circular 5—Suggestions for the Use of Fertilizers in Alberta.
Circular 7—Creeping Red Fescue.
Bulletin 9—Planning and Beautifying the Home Grounds.
Bulletin 10—The Production of High Quality Cream.
Bulletin 11—Planting Deciduous Trees and Shrubs.
Bulletin 12—Planting Evergreens.
Circular 13—Swine Parasites.
Bulletin 16—Home Decoration.
Bulletin 17—The Value and Use of Milk.
Bulletin 18—Meat Cookery.
Bulletin 19—Variety in the Use of Vegetables.
Circular 20—The Prevention of Anemia in Sucking Pigs.
Leaflet 21—Melilot Taint.
Bulletin 22—Potato Production in Alberta.
Leaflet 23—Hints to Beginners in Beekeeping.
Leaflet 25—Pullorum Disease in Chicks.
Leaflet 26—Poultry Feeding Formulae.
Leaflet 27—Poultry Farm Sanitation.
Leaflet 28—Tuberculosis of Poultry.
Leaflet 29—External Parasites of Poultry.
Leaflet 30—Internal Parasites of Poultry.
Leaflet 31—Coccidiosis.
Leaflet 32—Respiratory Diseases of Poultry.
Bulletin 33—Four Bad Weeds.
Circular 34—Suggestions for Storing Grain Crops On the Farm.
Bulletin 35—Beekeeping for Beginners in Alberta.
Leaflet 36—Disorders of the Cloaca and Vent.
Leaflet 37—Fowl Paralysis and Leukemia.
Leaflet 38—Construction of Sod Poultry House.
Leaflet 39—Production of Quality Market Eggs.
Circular 40—Flax Production in Alberta.
Circular 41—Grain Mites.
Circular 42—Control of Garden Pests in Alberta.
Leaflets 43—Special Weed Leaflets—Hoary Cress, Leafy Spurge, Quack
to 52— Grass, Wild Mustard, Wild Oats Canada Thistle, Field Bindweed, Sow Thistle, Toad Flax, Night Flowering Catchfly.
Bulletin 53—Dressing and Curing of Pork On the Farm.
Leaflet 54—Poultry Catching Crate.
Bulletin 55—Dairy Herd—Care and Management.
Leaflet 56—Brooding and Rearing of Chicks and Poults.
Bulletin 57—The Salad Bowl.
Bulletin 58—Wintering Bees in Alberta.

Bulletin 59—The Weed Problem in Alberta.
Circular 60—Spotlights On the School Lunch.
Leaflet 61—Poultry Prepared On the Farm for Marketing.
Leaflet 62—The Need and Use of Commercial Protein Mineral Supplements in Poultry Feeding.
Weeds of Alberta.
Honey Helpings.
Use Honey for Canning and Preserving.
Circular 63—The Selection and Seeding of Grasses and Legumes.
Circular 65—Protect Your Sheep.
Bulletin 66—Feeding and Management of the Laying and Breeding Flocks.
Bulletin 67—Canning for Victory.
Circular 68—Wild Rose Hips for Vitamin "C".
Circular 69—Diseases of Suckling Pigs.
Bulletin 70—Electricity On the Farm.

JOINT SERIES:

Publication No. 1—Wheat for Swine in Alberta.
Publication No. 2—Budding and Grafting.
Publication No. 3—Feeding and Management of Swine.